

Predictions: *Pile Driver*

Name: _____

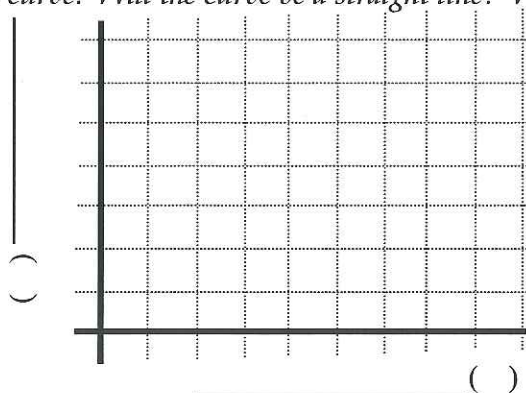
Outcome Tested	Your Score
0.1 Indep/Dep	
0.2 Graph	
0.3 Slope	
0.4 Analysis/Conclusion	
0.5 Complete and On Time	
0.6 Lab Group	
1.1 Energy Transfer	

Is there a relationship between the drop height of a pile driver and the distance the can was crushed? *If you think there is a relationship, then describe it. If you don't think there is a relationship, explain why you think that.*

Is there a relationship between the energy that I give to the weight when I lift it and the energy that the weight can transfer to the can when it falls? *If you think there is a relationship, then describe it. If you don't think there is a relationship, explain why you think that.*

A student lifts up a heavy weight and drops it onto a soda can. She then takes data about the height (cm) at which she drops the weight and the difference in height (cm) of the can that the weight hits. Sketch a graph of your expected results.

(Do NOT put any numbers in this graph. Just put the correct labels and units on the axes and then sketch in a curve. Will the curve be a straight line? Will it curve up? Will it curve down? Etc.)



Investigation 1: *Pile Driver*

Focus Questions:

Prediction:

Be sure to attach the prediction sheet that you filled out earlier.

Materials:

Pile Driver

10 Soda Cans (Use the same brands - i.e. Coke, Pepsi, etc.)

Meter Stick

Nickel

Part I:

Procedure: (Write out the procedure that your group will use. Be sure to list it step-by-step giving enough detail to allow anyone to repeat your experiment.)

CAUTION: Please be careful when dropping the pile driver. Move your hands and fingers out of the way. Tell your partners to clear the area before the pile driver is dropped!!

1. Gather materials. Set up the pile driver tube.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

Part II:

Procedure:

1. Place the nickel on the base plate so that it stands vertically.
2. Drop the mass from a height of 1 m onto the nickel.
3. Immediately retrieve the nickel and record your observations about:
 - a. Its temperature
 - b. Its shape

Data Tables:

Can	Can Height (cm)
Can 1	
Can 2	
Can 3	
Average Can	

Mass of the Pile Driver: _____ g			
Height of Drop (cm)	Avg. Can Height (Copy from table above) (cm)	Can Height after Drop (cm)	Difference in Can Height (amount of "squish") (cm)

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Height of Drop (cm)	Avg. Can Height (Copy from table above) (cm)	Can Height after Drop (cm)	Difference in Can Height (amount of "squish") (cm)

Pre - Graph:

Before you begin to graph your data, answer these questions:

- a) What variable did you deliberately change in Part I? Which variable is INDEPENDENT? _____
- b) What variable did you measure that you yourself did not change? Which variable was DEPENDENT? _____
- c) Which variable goes on the X axis? _____
Explain.

- d) Which variable goes on the Y axis? _____
Explain.

Graph: Use the graph paper provided to graph your data for the HEAVY MASS FIRST. Draw in your best fit line for the data. Then graph your data for the lighter mass on the same graph. Use a different color or find some way to make the two graphs clearly different. Having both sets of data on the same graph will allow you to compare them easily. Make sure to find the slopes of BOTH lines and label it on your graph. Be sure to attach your graph to your lab report printout.

Conclusion: (On looseleaf)

Include: 1. The answer to the lab question/problem

2. Evidence from the lab that proves your answer is correct.

This will include:

a. examples of the data

b. description of the graph and what it shows.

c. the slope and units from the graph and what the slope means

Additional Analysis Questions: (On looseleaf)

1. Do you transfer more energy to the pile driver weight when you raise it to a higher height? How do you know?
2. When the can is crushed, is energy transferred to it? By what? How do you know?
3. Where did the pile driver obtain the energy to crush the can?
4. List to order of the energy changes as the types of energy change during a trial of the pile driver lab. Include the following points of the lab:
 - a. weight is at the top
 - b. weight is falling, but not yet at the bottom
 - c. weight is just above the can
 - d. weight has crushed the can
5. Was energy transferred in the demonstration in which the nickel is crushed? How do you know? Why did this happen?